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Choking Under Pressure on the PGA Tour

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CHOKING UNDER PRESSURE ON THE PGA TOUR

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Abstract

The productivity of individuals can be altered by cognitive environmental factors such as those that induce psychological pressure. The goal of this analysis is to determine the extent to which a selection of variables influences an individual's perception of pressure and its subsequent effect on productivity. To do so, the performance of golfers under pressure on the PGA TOUR was proxied using the scrambling percentage statistic. Two regressions, one using data from players who were cut at the end of the second round and the other using data from players who were not cut at the end of the second round, were used to study how golfers' scrambling percentage for a given round was influenced by changes in experience, time, rank, tournament prestige, and their expected future performance. An increase in variables representing tournament prestige, tournament round number, and player position on the leader board lead to an increase in pressure which in turn leads to poorer subsequent performance. On the other hand, an increase in player experience and the knowledge that a player would be cut at the end of the second round tend to decrease pressure and increase player performance.

I. Introduction

An individual's ability to perform well under pressure is a crucial component of success in a wide range of actions. In business, employees may be required to make critical presentations to clients, submit written reports to superiors under a deadline, or negotiate contract deals with suppliers. Often times when individuals are placed in a position where performance of a complex task under pressure is critical, the presence of pressure causes them to exhibit a phenomenon known in psychology by the term "choking" as detailed by Beilock and Carr (2005). Choking is often associated with a decrease in the ability to perform tasks that can be either physical, such as hitting a golf ball, or cognitive, such as performing a mathematical computation. It is useful for economists, employers, and school administrators among others to understand what factors increase an individual's perception of pressure so that they can design incentives that work to maximize performance by minimizing pressure. This analysis describes the extent to which factors such as time, rank, experience, prestige, and predicted future performance influence an individual's perception of pressure and its related effect on performance.

The second section of this paper reviews past research on performance under pressure in both psychology and economics. This section makes an important distinction between the importance of the cognitive processes, which characterize performance under pressure, and the importance of factors that induce choking and lead to decreased performance.

While past research in the field of psychology focuses on how choking occurs, behavioral economists and I will focus on the extent to which key factors induce choking and decrease performance.

The third section of this paper reviews past literature discussing the dependent proxy variable of interest in this analysis: scrambling percentage. Despite the highly accurate nature of scrambling percentage in predicting the performance of PGA TOUR golfers, it is clear that research on this statistic with respect to performance under pressure is nonexistent. This section highlights the gap in literature surrounding both choking and the scrambling percentage statistic while detailing how this analysis attempts to fill it.

The fourth section is a detailed analysis of the dependent and independent variables that are used to provide context for readers who are unfamiliar with terminology, tournaments, and the structure of the PGA TOUR. Readers familiar with golf and the PGA TOUR may look to table 5 for a brief overview of the variables used.

The fifth section is a review of the data used in this analysis. It includes information on how the data was recorded, the structure of each observation, and where the data may be obtained for interested readers.

The sixth section of this paper addresses why scrambling percentage is an ideal variable for determining how golfers perform under pressure as well as listing the hypotheses I test in this analysis. There are five hypotheses in all, each addressing a certain pressure-inducing factor proxied for by the variables in the analysis.

The seventh section in this paper consists of a discussion of the results from regression analyses 1 and 2. This discussion consists of a variable-by-variable confirmation or rejection of the hypotheses detailed in the previous section. Each of the hypotheses holds true for the first regression, however results from the second regression show that players who can predict that they will be cut after the second round respond differently to the independent variable set than players who make the cut after the second round. The most noticeable differences can be found when studying changes to the coefficients on *roundnumber* and *majortournament.*

II. Theory and Background

Literature on the subject of choking is prevalent in the field of psychology with two main theories describing how and why choking occurs. Ashcraft and Kirk (2001) and Eysenck and Keane (1990) explain the causes of choking by showing that feelings of anxiety cause situational worries that occupy a portion of the brain's working memory capacity usually reserved for the execution of skilled actions. This explanation, commonly referred to as the distraction theory, was first elaborated upon by Wine (1971). A second theory of choking, named the explicit monitoring theory, was presented by Baumeister (1984) and later by Lewis and Linder (1997). This theory states that an increase in pressure raises anxiety about preforming well. Increased anxiety causes the individual to pay greater attention to processes that require skill or step-by-step control, which in turn causes a disruption in proceduralized actions. This analysis is not particularly concerned by the mental mechanisms by which choking occurs, rather the focus of this paper is to determine the extent to which certain factors trigger these mechanism. However, the above descriptions of the psychological processes involved in choking provide an interesting context from which to view the analysis to follow.

After having set aside the psychological aspects of choking, it is appropriate to divert our attention to the field of economics where the focus shifts from how chocking occurs to why it occurs. In the field of behavioral economics, Kamenica (2012) stresses that whereas psychologists are interested in the circumstances that cause chocking under pressure, economists are more concerned with the resulting degradation in performance as well as the factors that influence performance. For example, Ariely et al. (2009b)

found that when monetary incentives are increased as a reward for correctly performing identical tasks, higher monetary incentives correlated with a decreased success rate in performing the tasks. These experiments worked by giving individuals in India a timed cognitive test, which, if they completed it successfully, would result in a monetary reward. As the monetary reward increased from a few rupees to several times the average individual's wage, the task completion rate of each sample decreased accordingly.

The field of sports economics is full of literature regarding the effect of high-pressure situations on the performance of players. Paserman (2010), using a recursive programming algorithm to determine the importance of points in Grand Slam tennis tournaments, found that the performance of players decreases as the importance of the point decreases. The field of golf is particularly well suited to the study of performance under pressure because accurate hole-by-hole data recorded by the PGA TOUR has been kept since 1983. Beilock and Carr (2001) found that choking occurs more often in situations where the individual has a high desire to perform well. In this experiment, golfers of varying skill levels were asked to putt in a pretest, practice, and posttest environment. The test consisted of a recitation of the steps required to accurately putt the ball to the target. Results indicated that golfers of all skill levels performed more poorly across the board in their posttest putts. These results occurred because the individuals placed pressure on themselves to perform each of the individual steps they had listed, thus disrupting the overall proceduralized action.

III. Review of Literature

This paper focuses on the effects of performance under pressure using a relatively new PGA TOUR statistic called scrambling percentage. While the PGA TOUR began recording this statistic for public consumption starting in 1992, reliable hole-by-hole scrambling data did not make its way to the PGA TOUR's ShotLink system until 2002. The diminished availability of holy-by-hole scrambling statistics has, according to Heiny (2008), caused the majority of prior research to ignore this statistic until 2004. The few past analyses regarding scrambling percentage that do exist have centered on analyzing this statistic's predictive capability in determining the success of PGA TOUR golfers. Finley and Halsey (2004) found that scrambling percentage is second only to greens in regulation in determining overall golfing performance. Heiny (2008) confirmed these results and added that scrambling percentage has an even higher correlation with scoring average and money won in select years. These findings increase general confidence in using scrambling percentage as a predictive tool for measuring golfer performance, but they are of little direct interest to economists.

The research discussed in the previous section is also found lacking a more holistic understanding of the extent to which a set of factors induce choking and decrease performance. Using the field of psychology as an example, Beilock and Carr (2001) showed that golfers suffer from choking when they have a high desire to perform well, however their research was not concerned with practical environmental factors that could cause them to feel as such. Passerman (2010) presents research that addresses how men and women differ in their response to pressure stemming from the importance of the

point in play. Unfortunately, the recursive algorithm used to determine the importance of these points merely defines importance as the probability that player 1 wins the match conditional on him or her winning the current point minus the probability that player 1 wins the match conditional on him or her losing the current point:

$$Importance_i = Prob\ (player\ 1\ wins\ match \mid player\ 1\ wins\ point\ t) - Prob\ (player\ 1\ wins\ match \mid player\ 1\ loses\ point\ t).$$

The variables addressed in this regression, such as whether a given shot was a “put the ball in play” shot, “winning” shot, or “unforced error”, are excellent proxies for determining the importance of points in tennis, but the importance of these results is somewhat restricted.

The purpose of this analysis is to fill the gaps in literature at the intersection of the study of the factors that induce chocking and decrease performance and the study of the statistic scrambling percentage. This paper includes a more holistic approach to determining what these factors are, to what extent they important, and how they interact with each other to influence player performance.

IV. Discussion of Variables

Variables for the multiple linear regressions 1 and 2 include *scramblingpercentage*, *roundnumber*, *endofroundfinishposnumeric*, *endofroundprevpos*, *fedexcup*, *majortournament*, *ageyearnum*, *scramblingfromtheroughattempts*, *scramblingfromthefringeattempts*, *scrambling30yardsatttempts*, *scrambling2030yardsatttempts*, *scrambling1020yardsatttempts*, and *scrambling10yardsatttempts*.

The dependent variable, *scramblingpercentage*, was used as a proxy for a golfer's performance under pressure. Scrambling is characterized by three possible values: null if the golfer hits the green in regulation, 1 if the golfer misses the green in regulation but makes par or better (a scrambling success), and 0 if the golfer misses the green in regulation while making a bogey or worse (a scrambling failure). The scrambling percentage is defined as the percentage of time a player misses the green in regulation but still makes par or better.

The independent variable *roundnumber* corresponds to the number of the round in the tournament. All PGA TOUR tournaments used in this analysis contain four rounds with the first round traditionally taking place on a Thursday and the final round taking place on a Sunday. Changes to this format may occur when abnormal weather conditions force temporary postponement of the completion of a round until a later time. Players finishing in the bottom half of the field at the end of the second round are dropped while players in the top half go on to compete for cash prizes at the end of the tournament. The variable *endofroundfinishposnumeric* is defined as the numerical

position on the leaderboard for a given golfer at the end of a given round. The variable *endofprevroundpos* is defined as the position on the leaderboard for the player at the end of the previous round. The variable *fedexcup* is a dummy variable showing whether the tournament in question is either The Barclays, The Deutche Bank Championship, The BMW Championship, or The Tour Championship. These tournaments are part of the FedExCup playoff system instituted in 2007. Players compete to earn FedExCup points determined by their finishing position at the end of each tournament in a season. The top 125 point leaders advance to The Barclays and the field is successively narrowed down until the top 30 point leaders compete in the PGA Tour Championship. 1st prize at the end of the tournament is $10 million of a $35 million bonus fund. The variable *majortournament* is a dummy variable showing whether or not the tournament in question is one of The Masters Tournament, The U.S. Open, The Open Championship, or the PGA Tour Championship. These are widely recognized as the most prestigious annual tournaments on the PGA TOUR and are collectively called The Majors. The variable *ageyearnum* is equal to the age of the golfer in years. The variables *scramblingfromtheroughattempts* and *scramblingfromthefringeattepmts* correspond to the number of scrambles where the birdie shot is from the rough or fringe respectively during the round. The variables *scrambling30yardsattempts* through *scrambling10yardsattempts* correspond to the number of scrambles where the birdie shot is taken from within the declared distance.

V. Data Format and Regression Analysis Structure

All data for regressions included in this analysis was obtained from the PGA TOUR ShotLink System. This system was first implemented starting in 1983 and upgraded by IBM in 1999 to its current form. Each tournament uses approximately 250 volunteers as walking scorers and laser operators to collect information regarding the characteristics of each shot. The data is then stored in secured servers where it can be accessed by the media and the general public upon request. The data was organized, manipulated, and regressed using the statistical software package Stata/IC.

The data set used in this analysis consists of observations at the round level. In other words, data recorded for each hole played by each player in each tournament in a given year has been aggregated to yield data on each round played by each player in each tournament in a given year. For example, an observation of the scrambling percentage is the sum of scrambling successes divided by the sum of scrambling attempts in a given round for a given player in a given tournament in a given year.

The analysis was split into two multiple regressions using data that total the relevant variables for a given player's round in a specific tournament. The first regression uses data for all rounds from players who made the cut after the second round. The second regression uses data from rounds one and two for players who were cut after the end of the second round. The data set included round level information from 2002 to 2012.

A two regression strategy was used in order to avoid complications arising from combining data from poorly performing players in rounds one and two with data from

well performing players in rounds three and four. By segmenting the data into these two groups, this analysis avoids overstating the improvement in player performance in rounds three and four attributable to changes in the composition of the field of players. This method does have one drawback. Players making the cut after the second round by playing above their inherent skill level in rounds one and two may tend to revert to their mean performance in rounds three and four. There is a possibility that this might depress statistics on player performance in rounds three and four. Unfortunately, dropping the bottom half of the field after the second round is a characteristic inherent in most tournaments on the PGA TOUR. Furthermore, the effects of reversion to the mean are indistinguishable from the effects of poor performance under high-pressure situations.

The model for both regression analyses is as follows:

$$scramblingpercentage = \beta_1 roundnumber + \beta_2 careertournaments + \beta_3 endofroundfinishposnumeric + \beta_4 fedexcup + \beta_5 majortournament + \beta_6 ageyearnum + \beta_7 scramblingfromtheroughattempst + \beta_8 scramblingfromthefringeattempts + \beta_9 scrambling30yardsatttempts + \beta_{10} scrambling2030yardsatttempts + \beta_{11} scrambling1020yardsatttempts + \beta_{12} scrambling10yardsatttempts$$

This paper focuses on the analysis of coefficients on variables that do not describe the characteristics of the lie of the ball before the birdie stroke is taken. Coefficients β_7 through β_{12} are omitted from the discussion because these coefficients vary in patterns that are consistent with the physical difficulty of the shot and have little to do with cognitive environmental variables that influence of pressure that golfers may feel. They are merely included in this analysis to improve the goodness of fit of the regression

models and to remove any hidden, minor correlations between the lie of the shot and the environmental variables of interest.

VI. The Importance of Scrambling and Related Hypotheses

Scrambling percentage serves as a unique proxy for performance under pressure because in order for the statistic to be applicable, the player must hit a poor tee shot or approach shot that causes them to miss the green in regulation. Thus, each scrambling attempt carries with it the added pressure of failure on the previous shot. It is also unique because it combines both the skills of chipping and putting. Performance under pressure must be maintained for two consecutive shots in order to achieve a successful scramble. Performance under pressure is defined as the ability to bounce back from failure while also dealing with a list of other cognitive environmental factors. These other environmental factors may serve to alleviate the pressure felt on the birdie shot or they may serve to exacerbate it depending on the nature of the factor.

Hypothesis 1.

The first hypothesis deals with the variable *roundnumber*. This variable is used as a proxy for the time remaining to accomplish an objective. On the PGA TOUR this variable represents the time remaining to improve one's position on the leaderboard and thus, win a larger cash prize at the end of the tournament. The less time that remains in the tournament, the greater the importance of the player's performance relative to his current position. If a player performs poorly in the first round, he has three subsequent rounds to improve his performance. If a player performs poorly in the final round, he has no chance to make up for his mistakes before the end of the tournament. Thus, I expect *roundnumber* to vary inversely with scrambling percentage.

Hypothesis 2.

The next hypothesis deals with *endofroundfinishposnumeric*. I expect that the player's position at the end of a round is a function of his performance during this round. Thus, I expect the players numerical finishing position at the end of the round to vary inversely with his scrambling percentage during the round.

Hypothesis 3.

The third hypothesis focuses on *endofroundprevpos*. The position of the player at the end of the tournament varies inversely with the amount of prize money the player wins. Thus, players that are higher up on the leader board are competing with each other for higher marginal gains and losses than players at the bottom of the leader board. Competition for higher earnings increases pressure on players as shown by Areily et al. (2009b). I expect to find that lower the players position number at the end of the previous round, the worse he will perform in the subsequent round.

Hypothesis 4.

The fourth hypothesis deals with the related variables *fedexcup* and *majortournament*. These variables serve as proxies for the prestige of the tournament. The more prestigious the tournament, the more pressure players are under to perform well. Good performance in a prestigious tournament can help players sign sponsorship deals worth million of dollars which can also lead to increased pressure. I expect the coefficients on these variables to be negative as such.

Hypothesis 5.

The last hypothesis focuses on the variable *ageyearnum*. This variable is used as a proxy for golfing experience. I expect more golfing experience, both on and off the PGA TOUR, to correlate with better performance under pressure and *ageyearnum* to vary proportionally to scrambling percentage. The extent to which performance under pressure is learned or innate is slightly more challenging however. Though the coefficient may be positive, it is hard to say whether or not the coefficient is large enough to have practical ramifications.

VII. Discussion of Results

The results from Regression 1 and Regression 2 reveal how players respond when placed in high-pressure situations. The coefficients from these regression are all statistically significant at the $p<0.000$ level except for that of *fedexcup* and *scramblingfromtheroughattempts*. The variable *fedexcup* is not statistically significant in either regression while *scramblingfromtheroughattempts* is significant at the $p>0.000$ level in regression 1 and significant at the $p>0.002$ level in regression 2. The following coefficient-by-coefficient analysis provides insights into what environmental factors increase pressure on PGA TOUR golfers to the extent that they decrease performance. The coefficients themselves also provide information regarding the extent to which some variables may have stronger effects on player performance than others.

The coefficient on the variable *roundnumber* in regression 1 suggests that for each successive round, golfers that made the cut after the second round are likely to lose 1.4% on their scrambling percentage. This implies that as the end of the tournament nears, golfers feel an increasing amount of pressure to perform, thus validating the first hypothesis. Towards the end of a tournament, golfers have less time to make up for poor performance. This can cause golfers to feel greater anxiety and can consequently lead to a self-fulfilling prophecy of poor performance brought on by the fear of poor performance. The magnitude of this effect is quite large. Scrambling percentage tends to be 4.2% less at the end of a tournament than it is at the start of the tournament.

Unlike the first regressino, the coefficient on *roundnumber* in the second regression is positive 4.5%. In other words, golfers failing to make the cut after the

second round scramble 4.5% better in the second round than they did in the first round. This represents an invalidation of the first hypothesis with the caveat that interaction between tournament cutoff structure, players' perception of whether they will be cut, and the round number caused the deviation from the hypothesis. This suggests that golfers who know that they are unlikely to make the cut after the end of the second round perform better due to the absence of pressure. This conclusion further reinforces our notions of how time and predicted performance combine to influence golfers' perception of pressure.

The coefficient on the variable *endofroundfinishposnumeric*, -0.510%, in the first regression serves as in interesting juxtaposition to the coefficient of the related variable *endofroundprevpos*, 0.325%. It is intuitive to believe that the lower the number of the player's position at the end of the round, the better their scrambling percentage must have been during that round to get them there. However, it is interesting to see that the better a player's position is on the leaderboard, the more poorly he is likely to scramble during the following round. Perhaps this behavior can be described as a reversion to the golfer's mean scrambling percentage. An alternative explanation would be that as the player climbs the leaderboard, he finds himself in a position to compete for larger and larger winnings. Due to the concave nature of the payout structure for tournaments on the PGA TOUR, the higher a player is on the leaderboard, the greater the consequences of his actions. Players higher up on the leaderboard gain and lose greater sums of money if they pass or fall behind a competitor than do players who are lower on the leaderboard. This increase in marginal winnings variability corresponds to an increased feeling of pressure and corresponding poor performance, thus validating the second and third hypothesis.

While the coefficient on *endofroundfinishposnumeric* remains around -.5% for regressions 1 and 2, the coefficient on *endofroundprevpos* falls to 0.102% in the second regression. The logic behind this drop is similar to that in the discussion of the coefficients on *roundnumber*. Players who know they will miss the cut at the end of the second round regardless of their position on the lower half of the leader board tend to scramble better because they are under less pressure.

The relationship between coefficients on the dummy variables *majortournament* and *fedexcup* in the first regression is also intriguing. The coefficients on both variables are negative as would be expected under the hypothesis that these tournaments carry more prestige and higher purse values. With more prestige and higher purse values at stake, players are more likely to feel more pressure to perform and may scramble worse as a result, thus validating the fourth hypothesis. While the coefficient on *majortournament* is -2.10%, the coefficient on *fedexcup* is almost an order of magnitude less in addition to being statistically insignificant. These large differences from seemingly similar dummy variables may result from the fact that players in the FedEx Cup need to play at a consistently high level throughout the season in order to make the top 125 point leaders. It may be possible that players who accumulate the necessary points to qualify for the FedEx Cup consistently perform better in high pressure situations than players who merely succeeded in passing the qualifying rounds for The Majors. Data used to calculate the coefficient on *fedexcup* was limited as the playoff was only instituted in 2007 and each tournament in the FedEx Cup has a limited field of golfers when compared to other tournaments. A lack of historical FedEx Cup data may be causing the coefficient on *fedexcup* to lose significance.

In the second regression, the coefficients on *majortournament* and *fedexcup* double to -3.97% and -0.726% respectively, thus bucking the trends discussed for *roundnumber* and *endofprevroundpos*. The implication is that regardless of the fact that golfers know they are unlikely to make the cut after the second round, the prestige surrounding The Majors and the FedEx Cup places golfers under greater pressure to perform. This serves as an interesting juxtaposition to the results discussed for *roundnumber*, highlighting how the interaction of various variables plays a key role in determining perceived pressure.

The coefficient on the variable *ageyearnum* appears small at about 0.53% for both regressions, but it is important to keep in mind that the standard deviation for the age, in years, for players on the PGA TOUR in 2012 was around six or seven years. About 95% of PGA TOUR golfers are between 20 to 48 years of age, which implies a scrambling percentage variation of 1.5% for this segment of golfers. Age can be interpreted as a proxy for golfing experience, revealing that although golfers are able to improve their scrambling percentage with experience, the gains are small on an incremental basis. Although the fifth hypothesis has been validated, the takeaway from analysis of this variable is that performance under pressure is more innate than it is learned. In other words, performing under pressure is not necessarily a skill that is learned through experience, but rather an ability subject to environmental factors and innate psychology. Furthermore, the similarity on coefficients between both regressions implies that the effects of age on performance under pressure are independent from environmental factors such as the golfer's knowledge about whether or not they will make the second round cut.

VIII. Conclusions

Scrambling percentage serves as an excellent proxy for how players perform under pressure because missing the green in regulation places the golfer in an already heightened state of stress that can either be amplified by other cognitive environmental factors or alleviated by the lack thereof. Despite the fact that scrambling percentage tallies have been kept since 2002, no researcher has attempted to use this statistic as a proxy for factors that affect performance under pressure. This analysis attempts to close this gap in the literature by using two regressions, the first for players who made the cut at the end of the second round and the second for those who did not, with samples under varying degrees of pressure to determine the extent to which key factors influence performance under pressure.

The analysis of both regressions reveals that cognitive environmental factors such as time to tournament completion, tournament prestige, payout structure, position, experience, and tournament structure all have significant effects on the player pressure which materialize in the form of chocking. As time goes on, players feel an increase in pressure, which forces them to perform more poorly. More prestigious tournaments add pressure, which in turn causes players to choke more often. Players that perform well in a previous round face an increase in marginal gains and losses in prize money causing them to feel more pressure and perform more poorly. On the other hand, players that perform poorly to the extent that they foresee being cut at the end of the second round end up performing better in the second round because they are under less pressure to do so. Lastly, increased experience has a marginal effect on player performance, which

materializes independently of whether or not they are to be cut at the end of the second round.

These results have implications in all aspects of human action where performance under pressure is a component. For example, pressure to succeed when competing for a promotion may increase as the prestige of the promotion increases. The ability to cope with pressure while working on a presentation may decrease if the individual has multiple future opportunities to present or if the individual has years of experience in doing so.

IX. Recommendations

Future research on the effects of cognitive environmental factors on performance under pressure should seek to narrow the scope of the analysis to specific tournaments or specific segments of the field of players. Researchers might look perform regressions specific to tournaments included in The Majors or in the FedEx Cup to determine what interaction tournament prestige may have with the factors discussed in this paper. Other analyses should seek to focus on specific segments of the population of golfers who are cut after the second round, particularly the slice of the field that lies on the edge between being cut after the second round and making the cut. Future studies should also look at how these factors affect golfers who are traditionally inexperienced, golfers with years of PGA tour experience, and golfers who hold a rank on the all-time money list.

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Statistical Tables

Summary Statistics Table 1.

Variable	Mean	Standard Deviation	Min/Max
roundnumber	2.497276	1.131503	1/7
endofroundfinishposnumeric	35.94481	24.4044	1/168
endofroundprevpos	36.32772	25.44214	1/173
fedexcup	.0531032	.2242399	0/1
majortournament	.0605151	.2384395	0/1
ageyearnum	34.90869	6.721105	18/74
scramblingfromtheroughattempts	1.90048	1.637931	0/11
scrambling2030yardsattempts	.7931968	.9891297	0/7
scrambling1020yardsattempts	1.899395	1.676789	0/12
scrambling10yardsattempts	1.0114421	1.144109	0/8
scramblingpercentage	.6058657	.2249839	0/1

Summary Statistics Table 2.

Variable	Mean	Standard Deviation	Min/Max
roundnumber	1.458167	.5985231	1/2
endofroundfinishposnumeric	100.492	48.03102	1/999
endofroundprevpos	92.61329	36.53266	1/180
fedexcup	.0547032	.2274018	0/1
majortournament	.0755325	.2642507	0/1
ageyearnum	35.43008	7.333092	18/74
scramblingfromtheroughattempts	2.240144	1.817791	0/13
scrambling2030yardsattempts	.9027643	1.106788	0/8
scrambling1020yardsattempts	2.004095	1.841652	0/11
scrambling10yardsattempts	.9559138	1.147877	0/9
scramblingpercentage	.5028718	.2028177	0/1

*This sample contains golfers who were cut after the end of the second round

Regression 1, Table 3.

Dependent Variable	Coefficient	Standard Error	P>|t|
roundnumber	-.0142935	.0007271	0.000
endofroundfinishposnumeric	.0050999	.0000374	0.000
endofroundprevpos	.0032543	.0000314	0.000
fedexcup	-.0025223	.002795	0.376
majortournament	-.0210265	.0030168	0.000
ageyearnum	.0005299	.0000894	0.000
scramblingfromtheroughattempts	.004076	.0004451	0.000
scramblingfromthefringeattempts	.0324714	.0005823	0.000
scrambling30yardsattempts	-.0311139	.0006327	0.000
scrambling2030yardsattempts	-.0059117	.0006302	0.000
scrambling1020yardsattempts	.0098206	.0004041	0.000
scrambling10yardsattempts	.0297902	.0005884	0.000
constant	.6236326	.0041039	0.000
Number of observations = 105478	R-squared = .2602	Adj R-squared=.260	Root MSE=.19357

Regression 2, Table 4.

Dependent Variable	Coefficient	Standard Error	P>|t|
roundnumber	.045631	.0033487	0.000
endofroundfinishposnumeric	-.0005539	.0000202	0.000
endofroundprevpos	.0010177	.0000313	0.000
fedexcup	-.0072597	.0054074	0.000
majortournament	-.0397366	.005468	0.179
ageyearnum	.0005312	.000149	0.000
scramblingfromtheroughattempts	.0021899	.0007025	0.000
scramblingfromthefringeattempts	.0303877	.0009727	0.002
scrambling30yardsattempts	-.0326899	.0010149	0.000
scrambling2030yardsattempts	-.0069865	.0010779	0.000
scrambling1020yardsattempts	.0069732	.0006793	0.000
scrambling10yardsattempts	.027643	.0010553	0.000
constant	.3256629	.0097089	0.000
Number of obs. = 29126	R-squared = .1687	Adj. R-squared=.168	Root MSE=.18617

*This sample contains golfers who were cut after the end of the second round

Variable Key Table 5.

Variable Name	Variable Description
roundnumber	Number of the round
endofroundfinishposnumeric	Position rank at end of the round
endofroundprevpos	Position rank at the end of the previous round
fedexcup	Dummy variable denoting whether the round is part of a FedEx Cup playoff tournament
majortournament	Dummy variable denoting whether the round is part of a Major Tournament
ageyearnum	The age of the golfer at the start of the round in years
scramblingfromtheroughattempts	The sum of scrambles taken from the rough during the round
scramblingfromthefringeattempts	The sum of scrambles taken from the fringe during the round
scrambling30yardsattempts	The sum of scrambles taken from 30 yards from the hole or further during the round
scrambling2030yardsattempts	The sum of scrambles taken from 20-30 yards from the hole during the round
scrambling1020yardsattempts	The sum of scrambles taken from 10-20 yards from the hole during the round
scrambling10yardsattempts	The sum of scrambles taken from less than 10 yards from the hole during the round